On a mode of preparing Etching-ground for Engravers. By Mr. EDMUND TURRELL, *Engraver. Abstracted from a paper in the Transactions of the Society for the encouragement of Arts, Manufactures, and Commerce.*

All engravers are aware of the importance of obtaining a good etching ground. Many recipes have been published, to choose from which requires considerable experience; and when the recipe is good, failures frequently occur from the materials not being good, or from an improper mode of compounding them. To obviate these difficulties is the object of this paper.

Asphaltum is the most important material, as we know of no substance which will completely supply its place. Asphaltum, or Jews' pitch, is a solid mineral bitumen, supposed to be formed from inspissated mineral tar. There is an artificial asphaltum obtained from the manufactories of coal gas in London, which bears a strong resemblance to the genuine kind, and which answers equally well for many purposes, but not for etching ground.

There is some difficulty in distinguishing between these two articles; they resemble each other in their fracture; that produced from coal, however, is of a deeper black than the natural, the best of which is of a fine deep dark brown colour. If a small piece of the artificial kind be laid upon a hot iron, the vapour will resemble that produced by a piece of coal similarly situated, and a coaly cinder will remain behind. The smell produced in this instance is very nauseous, as both sulphur and ammonia, are disengaged and may be distinguished. When a small piece of genuine Syrian asphaltum is placed upon a hot iron, it will, if very pure, be nearly all converted into vapour, and the smell is by many persons, considered to be agreeable. The essential oil of turpentine dissolves it completely, and forms a liquid varnish, which resists the action of dilute nitrous acid; and which is therefore used by many engravers, to cover those lines, which, in the process of etching, have been sufficiently bitten in.

The above-mentioned properties of resisting the action of dilute nitrous acid, and its capacity of giving hardness and toughness to etching-ground, render it an ingredient of the very first importance. Burgundy pitch stands next in importance. This is obtained from the *pinus abies*, or Norway spruce fir-tree. The best kind for making etching-ground, is sold in bladders; and when perfectly good, is of an opaque yellow, rather darker than straw colour: by age it becomes dark coloured, and so brittle, as to be rubbed down between the fingers, which renders it much less fit for the engraver's use.

The third and last article is virgin wax. Much of that offered for sale is adulterated with suet, which spoils it for the purpose of making etching-ground, as it destroys its adhesive property. Wax thus adulterated, is soft and clammy to the feel, and is less transparent than when pure. If the surface of fine wax be rubbed with a linen cloth, it will take a much brighter polish than that which has grease in it. When cut into thin shavings with a sharp clean knife, a fine polish will be left upon the cut surface, whilst it will be dull in proportion to the quantity of suet with which it may be contaminated.

These three are the only ingredients necessary to make good etching-ground. Good asphaltum must be had at any price; the other two can be obtained without difficulty.

General directions for preparing and compounding the ingredients above named.

The asphaltum must be broken into small pieces, and if any pieces of clay or other impure matter are observed, they must be carefully taken out, and then it must be ground very fine in a marble or Wedgwood-ware mortar; and while it is under this process, if any hard stony material is discovered, it must be carefully taken out; it will then be ready to be mixed with the other materials, in the following manner.

Put four ounces of Burgundy pitch into a well glazed pipkin; let it melt gently over a slow fire, and move the pipkin round, so that the whole internal surface may be covered with the melted pitch. Then add four ounces of the ground asphaltum, and let the pipkin remain upon the fire until the two substances are tolerably well mixed, which will soon be effected if the mass be well stirred. Then add four ounces more of the asphaltum, and if the heat be increased, and the mass well stirred, the whole may be incorporated, and will be nearly as fluid as melted pitch.

When the asphaltum appears to be thoroughly melted, it should be kept in that state for at least a quarter of an hour, the heat being a a little lowered, but it must be stirred all the while, by which means a large portion of the moisture of the Burgundy pitch will be evaporated; and the essential oil of the pitch will be thoroughly incorporated with the asphaltum, and render the etching-ground more perfect; for, when this is omitted, evaporation takes place from the ground when spread upon the plate, after it has been laid on for a month or more, and sometimes in a shorter time, a circumstance which very often produces considerable difficulty to engravers, because when that takes place, the ground is rendered brittle, and frequently chips or flies from the plate, to the great detriment of the tints or lines ruled upon it. When the asphaltum and Burgundy pitch are thus prepared and incorporated, add six ounces of the best virgin wax, and keep the whole well stirred till it is completely mixed, and let it simmer gently for about ten minutes, when it may be taken from the fire, and suffered to cool until it is of the consistence of turpentine, or very thick treacle, and in that state it may be poured out upon the clean surface of a copper-plate, or well glazed earthenware dish, in portions sufficient to make a ball, which may in general weigh about an ounce, and when it is sufficiently cold, it must be rolled up into balls by the hands. and kept perfectly clean for use, provided it is found upon trial to be of the proper consistence, but this cannot be judged of until it has been laid upon the plate for a few hours. If it is too soft the etching point will make the lines of unequal breadth, or, as they are technically ruled, will be drag-lines, being in some parts very fine, and in others very gouty or thick. If it is too hard, the etching point will cause the lines ruled on the ground to chip, and then the edges will be notched or serrated, which would be very prejudicial to the appearance of fine even tints.

There is also another property that may be wanting where the proportions are not properly adjusted, namely, that of spreading kindly on the copper-plate. This fault in ground may be easily remedied, by the addition of a proper quantity of Burgundy pitch.

As each of the evil qualities above-named are likely to happen, on account of the different properties of the materials: and as, on that account, *general principles* or directions will be much more acceptable than mere arbitrary recipes, I shall now endeavour to lay down such *general rules*, that when either of the faults before described occur it may be immediately remedied.

In the first place, asphaltum makes the ground hard and tough, therefore if it wants that quality, more asphaltum must be added, but it must be previously dissolved in a proper proportion of Burgundy pitch, for otherwise it will be very difficult, if not almost impossible to get it thoroughly incorporated, after the virgin wax has been added. The propriety of this caution will be evident, when it is considered that Burgundy pitch is the *real solvent* for the asphaltum, and must therefore at all times be incorporated with it first; and for this reason it will always be the best way to make the ground rather too hard than too soft, because it is much easier to soften it than to make it harder.

Should the ground, upon trial, be found too hard, a small quantity of virgin wax may be added, which is all that is necessary to answer that purpose.

If, upon trying to lay it upon the copper-plate, it does not spread kindly, but clings to the dabber, and only partially covers the surface of the copper, this fault may be remedied by adding a small quantity of Burgundy pitch; but should this property prevail, and the ground also appear upon trial too soft, then Burgundy pitch and asphaltum must both be added, after they have been thoroughly incorporated together; for the principal circumstance to be attended to in making etching ground, is completely to dissolve the asphaltum; for although all the recipes I have read or heard of, direct the Burgundy pitch to be added *last*, yet I am convinced, from much experience, that as Burgundy pitch is the true solvent for asphaltum, these two ingredients should be first thoroughly mixed, by which means only can the real and beneficial effects of the asphaltum be fully obtained.

From what has been stated above, the following general rules or principles are deduced:

First, that asphaltum gives hardness and toughness to etching ground, and is indispensably necessary, on account of its valuable property of resisting the action of dilute nitrous acid.

Secondly, that Burgundy pitch acts as a perfect solvent for the asphaltum; and, when mixed, acts also as a vehicle to spread the ground over the surface of the copper-plate, a property essentially necessary to prevent foul biting.

Thirdly, that virgin wax assists in softening the ground, and giving it such a consistence, that when lines are cut through it by the etching point, the edges of each line will be extremely clear and free from flaws or chips, which would be destructive of the beauty expected from the etchings of the present improved state of the art of engraving.

I beg leave to observe, in conclusion, that my principal object in this communication, is to lay before my brother artists the result of several years experience, gained by careful practice, rather than submit to them novel experiments or arbitrary recipes which fix no useful or general principles in the mind, without which every attempt to modify or alter the composition, must be attended with uncertainty, and too frequently with disappointment.

ENGLISH PATENTS.

Patent granted to James Kay, *of Preston, Lancashire, for machinery for preparing and spinning flax, hemp, and other fibrous substances, by power.* Dated July 26, 1825.

The preparation of the flax used by the patentee is to macerate it in water as it is drawn out in slivers, previous to being spun. For this purpose he uses the common machine for drawing out the flax into narrow slivers; but instead of passing it to flys and bobbins for spinning, he places long narrow cans to receive it, which convey it into perforated vessels, into which they fit, and which are fixed in troughs containing water. When the slivers of flax are coiled up in the cans by the action of the machine, they are pressed down by a sort of pistons or rammers into the water, till all air is separated from between the fibres; and when the lower vessels are full, they are separated from the cans, and after being left for six or more hours, for the flax to macerate, are taken to the spinning machines, where their contents are transferred into other troughs, by turning them upside down, and the ends of the slivers being then placed between the rollers, are spun in the usual manner.

The spinning machines differ only from those in use in having the retaining rollers placed much nearer to the drawing rollers, the distance between them being, in the machines of the patentee, merely two and a half inches; the retaining rollers in these are preferred by him to be fluted, and to be made to revolve one turn only for every eight of the drawing rollers.

This close position of the sets of rollers, the patentee states, is permitted by the maceration of the flax, which allows the rollers to draw out the fibres in much shorter lengths than would be possible without this operation, by which means much finer thread can be made from the same materials, which arises, we suppose, from the fineness of the fibres thus drawn out, bearing a due proportion to their shortness.

The machines are represented in the drawings of this specification as being of the vertical sort, with the sets of rollers placed one above